

# Inheritance Law Reform and Women's Access to Capital

Evidence from India's Hindu Succession Act

*Klaus Deininger*

*Aparajita Goyal*

*Hari Nagarajan*

The World Bank  
Development Research Group  
Agriculture and Rural Development Team  
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## Abstract

This paper examines whether and to what extent amendments in inheritance legislation impact women's physical and human capital investments, using disaggregated household level data from India. The authors use inheritance patterns over three generations of individuals to assess the impact of changes in the Hindu Succession Act that grant daughters equal coparcenary birth rights in joint family property that were denied to daughters in the past. The causal effect is isolated by

exploiting the variation in the timing of father's death to compare within household bequests of land given to sons and daughters in the states of Maharashtra and Karnataka. The analysis shows that the amendment significantly increased daughters' likelihood to inherit land, but that even after the amendment substantial bias persists. The results also indicate a robust increase in educational attainment of daughters, suggesting an alternative channel of wealth transfer.

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This paper—a product of the Agriculture and Rural Development Team, Development Research Group—is part of a larger effort in the department to explore the role of policy reforms promoting equity and poverty reduction for women in developing countries. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The author may be contacted at [agoyal3@worldbank.org](mailto:agoyal3@worldbank.org).

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# Inheritance Law Reform and Women's Access to Capital: Evidence from India's Hindu Succession Act

Klaus Deininger, Aparajita Goyal, Hari Nagarajan\*

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# 1 Introduction

The importance of inheritances in the generation and transmission of lifetime resources is of considerable interest to economists and policymakers. Parental bequests of material wealth and human capital investments represent central forms of intergenerational transfer that affect long term development in far reaching ways (Becker and Tomes 1979; Stiglitz 1981). An extensive literature, both empirical and theoretical, shows that the transmission of physical and human capital from parents to children is a crucial determinant of households' wealth and earnings ability (Blinder 1973; Kotlikoff and Summers 1981). However, when the distribution of inherited wealth is highly unequal, the relative quantitative impact of this disparity on economic inequality is of considerable interest (Cowell 1998; De Nardi 2004).<sup>1</sup>

There is widespread view that inheritances perpetuate and may even intensify inequalities arising originally from other causes. In environments where information asymmetries and commitment problems limit the scope for raising capital against future earnings, modalities for transferring physical or human capital across generations play a potentially important role, through the impact on the productivity of resources, the choices open to individuals, the trajectory of asset accumulation, and ultimately the distribution of political power. At low levels of development, land is a key asset and an essential source of livelihood. It is thus not surprising to find that societies have long developed rules to govern the way in which land is transferred across generations (Platteau and Baland 2001).<sup>2</sup>

Women's ability to inherit property is restricted in many societies. For instance, in large parts of Africa and South Asia, widows and daughters possess only temporary rights to land that lowers productivity and increases the likelihood of being affected by land con-

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<sup>1</sup>Material transfers between one generation and the next are likely to be a major cause of inequality in general and of the unequal distribution of wealth in particular. The role of inherited material wealth in producing and perpetuating inequality has been discussed in Wedgwood (1929); Davies (1982).

<sup>2</sup>There is tremendous diversity in the rules and norms that govern the inheritance of real property across different societies, where inheritance might be governed by rules that endow the testator with little or no discretion regarding the distribution of his property; examples include primogeniture (inheritance by the eldest son), ultimogeniture (inheritance by the youngest son), and equal distribution among potential heirs, or where the testator is afforded considerably more discretion, as when the land is passed to the heir judged to be the best qualified to use it (Baker and Miceli 2005).

flict (Deininger and Castagnini 2006; Goldstein and Udry 2008). More importantly, in light of evidence documenting the importance of asset ownership for women’s bargaining power, livelihood opportunities, and intrahousehold allocation of resources towards consumption and investment, low legal rights to women’s property might be at the root of broader patterns of inequality.<sup>3</sup>

The idea that an improvement in women’s position relative to men’s is desirable, not only on equity, but also on efficiency grounds, is often advanced as an argument in favor of policies targeted towards women (Duflo 2003). Although the underlying cultural and social dynamics are complex, legal change to improve women’s inheritance rights could potentially provide a low cost means to reduce gender discrimination and improve a wide range of socio-economic outcomes for women. However, empirical study of the topic is rare.<sup>4</sup> Apart from a number of descriptive accounts noting that constitutional amendments to establish equality of women before the law had little impact on real-world outcomes (World Bank 2001), possibly because of low awareness, studies on inheritance rights are few and focus mainly on the distribution of wealth among different descendants (Platteau and 2001, Behrman and Rosenzweig 2004). In a recent study, changes in Muslim family law have been shown to affect household behavior in terms of marriage (Ambrus, Field, and Torero 2009). The fact that modifications in divorce laws in the US had significant impacts on female labor supply, asset accumulation, and domestic violence suggests that exploring the impact of legislative changes on inheritances, especially for women, may be an area where further study could yield significant insights of potentially high policy relevance.

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<sup>3</sup>Women’s ability to control and access resources such as land and independent income has been shown to confer benefits like long term reduction in fertility, higher investment in children’s education health and nutrition, and well-being of future generations. For instance, Thomas (1990) finds that income in the hands of women is associated with larger improvements in child health relative to income in the hands of men. For the link to fertility and child mortality, see Dyson and Moore (1983), Caldwell et al (1983), and Eswaran (2002). A number of studies find that childrens well-being is strongly correlated with womens income relative to mens, where women consistently devote a higher proportion of their income to family needs than do men. Refer to a survey by Strauss, Mwabu and Beegle (2000) for studies that find evidence from Cameroon, India, Kenya, Malawi, and the Dominican Republic.

<sup>4</sup>While the status of women in developing countries remains an important contemporary issue, there were historical implications of the inheritance legislation. For instance, it is frequently argued that the French birth rate dropped very rapidly in the 19th century following the revolutionary change and Napoleonic affirmation in the inheritance laws from primogeniture to equal division of estates amongst all children (Garner 1914)).

India has had a long history of legal activity to overcome a historical legacy of discrimination and high inequality, with varying levels of success.<sup>5</sup> Following a vigorous campaign, the prevailing inheritance legislation was amended nationally in 2005 to eliminate gender discrimination that had thus far prevailed in all but a few southern states that had amended the Act earlier. Specifically, the states of Maharashtra and Karnataka amended the Act in 1994 granting daughters equal shares in inheritance relative to sons that was denied to daughters in the past. The passage of sufficient time since the enactment of the amendment, and the availability of data over three generations of individuals provides an opportunity to assess the impact of the legal change on women’s asset endowment and their socio-economic outcomes. Specifically, we use data from the 2006 nationally representative Rural Economic and Demographic Survey (REDS) conducted by the Indian National Council for Applied Economic Research on 1371 rural Hindu households in the states of Karnataka and Maharashtra. The survey contains detailed information on parents, siblings and children of the household head, providing us with a quantitative measure for intergenerational transfers of both physical and human capital investments.

Our identification relies on a difference-in-differences strategy to estimate the impact of the Hindu Succession Act amendment, comparing the inheritance of land to males and females by fathers who died before and after the amendment of the Act in the states of Maharashtra and Karnataka. Our baseline results suggest that the amendment significantly increased women’s likelihood to inherit land although it was not effective in fully eliminating the underlying inequality. Furthermore, we find a robust increase in women’s age at marriage relative to men, suggesting an effect of stronger inheritance rights on women’s marriage market outcomes. Our results also point towards a positive and significant impact on women’s educational attainment. Girls who started their education after the amendment came into force had 0.3 years more of elementary education in 2006. Moreover, to the extent that estimated effects on women’s inheritance appear to increase over time, it can be attributed to learning about the content of the amendment, and would

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<sup>5</sup>A range of progressive legislation in India that aimed to modify undesirable social practices such as dowry or caste discrimination that has been ineffective in practice (Anderson 2003) provides reason for caution.

appear that, in the Indian context, better dissemination of the recent 2005 national legal change could significantly increase the potential impact on women's economic or social outcomes.

To our knowledge, this is the first attempt to estimate the impact of legislative changes in inheritance rights on women's ability to inherit and their socio-economic status in India. The study shows that while more gender equal inheritance rights did generate positive effects on women, it did not fully eliminate the underlying gender inequality. The paper contributes both to the literature on intergenerational transfers as well as the literature on intrahousehold bargaining. For instance, Becker and Tomes (1979) show that parental bequests of physical and human capital investments are important determinants of individuals' wealth and earnings ability. Infact there is widespread view that unequal distribution of inheritances is a major source of income inequality. This paper shows that legal barriers to women's ability to inherit property often put women at a strong disadvantage and may actually be at the root of broader patterns of inequality. In addition, it is now well understood that women's ability to control and access resources is important for a range of social and economic outcomes (Thomas 1990, 1994). Indeed, stronger inheritance rights for women are likely to be a potent mechanism leading to favorable outcomes along a range of dimensions.

The paper is structured as follows. Section 2 draws together the literature on intergenerational transfers, the importance of female asset endowments for a range of social and economic outcomes, and key provisions of India's inheritance law before and after the amendment. Section 3 outlines a conceptual framework for understanding the gains from the change. Section 4 discusses estimation strategy, introduces the data used, and presents basic descriptive statistics. Section 5 presents empirical results on land bequests, educational attainment and other socio-economic outcomes for women. Section 6 concludes by drawing out implications for research and policy.

## 2 Background

### 2.1 Importance of Women's Inheritance Rights

It is widely recognized that a unitary household model may not be an adequate description of reality and that, with heterogeneous gender related preferences, the distribution of resources within the household affect intrahousehold bargaining and associated socio-economic outcomes of individuals (Anderson and Eswaran 2009).<sup>6</sup> Women's ability to control and access resources such as land and independent income has been shown to confer benefits like long term reduction in fertility, higher investment in children's education, health and nutrition, and well-being of future generations. For instance, in South Africa, receipt of pensions by females as compared to males affected the anthropometric status of girls, suggesting differential preferences by gender (Duflo 2003).<sup>7</sup> In China, higher female incomes following agricultural reforms increased the survival rates for girls (Qian 2008). In India, exogenous increases in female income among lower castes significantly increased investment in schooling, particularly for girls (Luke and Munshi 2007), and women who own property (such as land or a house) faced significantly lower risk of marital violence than property-less women (Agarwal 1994). Increases in female bargaining power helped reduce fertility and rates of child mortality (Dyson and Moore 1983). Studies in a range of countries find that children's well being is strongly correlated with females' income relative to men's, as females devote a higher proportion of their income to family needs than do men (Behrman 1990, Strauss, Mwabu and Beegle 2000).

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<sup>6</sup>Recent empirical evidence suggests that the restrictions imposed on demand functions by common preference models are not well-supported. Rejections of the family income pooling assumption have been most influential in weakening economists' attachment to unitary models. The fraction of income received or controlled by one family member should not influence demands, conditional on total family income. A large number of recent empirical studies have rejected pooling, finding that earned and unearned income received by the husband or wife significantly affect demand patterns when total income or expenditure is held constant. In other words, income in the hands of women of a household has a different impact on intrahousehold allocation than income in the hands of the men. Some studies find that children appear to do better when their mothers control a larger fraction of family resources (Thomas 1990). Compared to income or assets in the hands of men, income or assets in the hands of women is associated with larger improvements in child health and education.

<sup>7</sup>Duflo (2003) studies whether the expansion of the old age pension program for Black households in South Africa, a permanent modification in the permanent income of eligible household members, led to a different impact on child nutrition, according to the gender of the eligible member. She shows that pensions received by women had a significant impact on the anthropometric status of girls as compared to pensions received by men, which is reflective of differential preferences of the two sexes.



In rural societies, a large fraction of households' endowment of physical capital is in the form of land, a key asset that serves not only as a source of livelihood but also a source of old-age support and status (Agarwal 1994). Restrictions on women's land rights and tenure security are likely to affect not only their bargaining power but have also been shown to lead to significant productivity losses (Udry 1996, Goldstein and Udry 2008). In many customary systems, inheritance, which often constitutes the main avenue for accessing land, remains heavily biased against females (World Bank 2001), that is often considered a key reason for persistence of gender bias over time. This is in line with evidence that differences in inheritance legislation affect economic outcomes and entrepreneurial activity across countries (Panuzzi et al. 2009).

The discussion of inheritance patterns in the literature has mostly abstracted from gender aspects. The wealth model (Becker and Tomes 1979) implies that altruistic parents provide children who have different abilities with different but efficient amounts of human capital, equating marginal returns to investment in schooling with the return to financial assets whereas the strategic bequest model (Bernheim, Schleifer, and Summers 1985) hypothesizes that parents assign bequests (inter vivos or post mortem) to children in return for care and old-age support. In a developed country setting, an equal allocation rule has been shown to generally prevail (Behrman and Rosenzweig 2004). However, in developing countries, interactions between pre-existing norms and structural changes make issues more complex. For example, exogenous changes in technology can shift land access within the household in favor of women (Quisumbing et al. 2004). In addition, while the nature and direction of payments at marriage is affected by several socio-economic factors (Anderson 2003), legal changes in family law can have far-reaching impacts as illustrated in Bangladesh where the value of dowry and prenuptial agreements increased when constitutional changes erected legal barriers to polygamy and decreased after additional divorce costs were imposed on men (Ambrus, Field, and Torero 2009).

An area of legislative change that has generated considerable empirical research relates to divorce legislation in the US (Peters 1986; Allen 1992; Friedberg 1998; Wolfers 2006). By removing the requirement for spousal consent for divorce, the law changed the terms

on which women could exit from an existing relationship. Giving women an option to exit relationships led to a one-third reduction of domestic violence not just by ending violent relationships but also by reducing violence in relationships that were not dissolved (Stevenson and Wolfers 2006). It also reduced investment in marriage specific capital while increasing married and unmarried females' labor force participation (Stevenson 2007), implying that the legal change affected not only the scope for household formation by those not yet married but, more importantly, that it also changed the bargaining power of spouses within existing marriages. A structural model viewing the intrahousehold distribution of power as affected by outside opportunities, including legislation on the assignment of property rights if the marriage is dissolved, and conditions in the marriage market (sex ratios) points in the same direction. For US data, the unitary model is rejected in favor of a bargaining model and the passage of a divorce law favorable to women is equivalent to a significant asset transfer to females (Chiappori et al. 2002).

To the extent that inequality in opportunity for women can be traced to legal provisions, amendments in inheritance legislation could generate an enormous effect on increasing female asset endowments, to bring about positive socio-economic outcomes typically believed to be associated with empowerment. Recent changes in India's inheritance legislation provide thus an ideal setting to explore the extent to which legal arrangements could provide low-cost means to increase female outcomes.

## 2.2 India's Hindu Succession Act Amendment

On a national level, the Hindu Succession Act (HSA) 1956, established to codify the law of intestate succession<sup>8</sup>, governs the property rights of Hindus today.<sup>9</sup> There are two main schools of Hindu law, *Mitakshara* and *Dayabhaga*. *Dayabhaga* is largely confined

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<sup>8</sup>To keep things simple and for purposes of clarity, we limit our discussion below to the case of intestate inheritance. This is justified on the one hand by the fact that in rural India formal wills are very rare. More importantly, as discussed below, the key innovation of the Hindu Succession Act amendment is to make females coparceners by birth, implying that their share can not be willed away. Field studies suggest that more than 65 percent of people in India die every year without making wills, and this proportion is much higher in rural areas, suggesting the enormous importance and applicability of succession acts to govern inheritances for individuals (Agarwal 1994).

<sup>9</sup>The Hindu Succession Act applies to more than 80 percent of the Indian population comprising of all Hindus, Buddhists, Jains, and Sikhs excluding Christians, Muslim, Parsis, and Jews.

to Bengal and Assam, while *Mitakshara* enjoys dominion over the rest of India (Carroll 1991). The *Mitakshara* system identifies two types of property: separate property and joint family property.<sup>10</sup> All Hindu individuals are entitled to give their separate property to a desired beneficiary by will. However, in the absence of a will, as a legal matter, the laws of succession are applicable and govern the inheritance of property.

Under the 1956 HSA, the separate property of a Hindu dying intestate (without a will) devolves in equal shares to class I heirs, first to surviving children (both sons and daughters) and spouse, followed by the heirs of the spouse. For joint property, the coparcenary is comprised of the father and his male lineal descendants. Female heirs, daughters and widows are not considered coparceners in *Mitakshara* joint family property do not receive a share and cannot demand partition. Therefore, sons receive two shares of the property, while daughters and spouses receive only one.<sup>11</sup>

Thus, although India's constitution provides for equality before law, females' ability to inherit equally to males in case of intestate succession was historically limited by the fact that, under the traditional (*mitakshara*) system applicable to most states, rights to ancestral or joint family property are limited to a group, called the coparcenary, that includes only male members of a dynasty. Coparceners acquire notional shares in joint family property, to be realized upon death. The 1956 HSA, which formalizes modalities of inheritance, established females' right to inherit but failed to make them coparceners. This implies that, upon intestate death of a Hindu head of household, each of the male

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<sup>10</sup>According to Roy (2008) the most important distinction between these two schools was in terms of their classification of property. The *Mitakshara* system made a distinction between 'joint family property' and 'separate property'. Joint family property consisted principally of ancestral property (that is, property inherited from the father, paternal grandfather or paternal great-grandfather), plus any property that was jointly acquired or was acquired separately but merged into the joint property, while separate property included that which was self-acquired (if acquired without detriment to the ancestral estate) and any property inherited from persons other than his father, paternal grandfather or paternal great-grandfather (Agarwal 1994). Under *Mitakshara*, three generations of male members became joint heirs or coparceners to the joint family property by birth while women had no such rights. The *Dayabhaga* system, on the other hand, treated all property as separate property, and does not recognize a coparcenary right to property.

<sup>11</sup>Historically, among the patrilineal Hindu groups, the inheritance rights of both widows and daughters were extremely limited, with those of the daughter being weaker than widows (Agarwal 1994). On the other hand, under the *Dayabhaga* system no distinction is made between separate and joint property with the owner maintaining absolute control over it. Upon a man's death, property went in the first instance equally to his sons. Widow and daughters could inherit only in the absence of male heirs. This meant that the probability of a widow or daughter inheriting some property was somewhat greater under *Dayabhaga* than *Mitakshara* (Agarwal 1994).

coparcener first receives his share of the joint family property, a process followed by the distribution of the deceased person's notional share of joint property among all male and female heirs, normally in equal shares. To illustrate, letting  $m$  be the number of (male) coparceners and  $f$  the number of additional females who are entitled to an equal share, intestate succession of a Hindu head of household would have each of the former receive a share of  $[(1/(m+1)) + (1/(m+1))/(m+f)]$  whereas each of the latter will receive only  $(1/(m+1))/(m+f)$  with the difference being the coparcener share.

To eliminate the gender inequality inherent in this practice, a number of states amended the 1956 HSA by stipulating that the daughter of a coparcener will become a coparcener herself by birth, i.e. acquire a status equal to that of a son.<sup>12</sup> These amendments, which was largely identical across states, were enacted by Andhra Pradesh, Maharashtra, Karnataka, and Tamil Nadu in 1986, 1989, 1994, and 1994, respectively.<sup>13</sup> The changes in entitlements introduced by the Hindu Succession Act Amendments (HSAAs) meant that the daughter's share in joint family property could not be willed away by the father. The change brought about by the HSAA constitutes an interesting natural experiment that allows us to explore, empirically, whether changes in inheritance legislation improve physical and human capital assets of women. This is of interest for India since, in 2005, the HSAA's coverage was expanded to cover the entire nation, along the lines of the amendments introduced in the southern states. In addition, the issue is of relevance for other countries where inheritance rules remain biased against women.

For legislation in this area to have an impact, those affected must be aware of content and implications of the law and compliance must provide advantages exceeding the cost of the effort needed to enforce compliance. At the same time, substitution effects need to be ruled out so that it is the spirit of the law, rather than just its letter, that is complied, e.g. by increasing the amount of physical capital transferred upon inheritance while at the same time decreasing the amount of human capital. Concerns about potential limited or even adverse effects of legal changes in inheritance legislation are reinforced by studies

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<sup>12</sup>Inheritances, being a concurrent topic in India, both the central and the state governments have the right to amend the laws concerning it.

<sup>13</sup>Kerala abolished joint family property system altogether in 1976 in favor of an arrangement where all family members hold their share separately (Agarwal 1994)

suggesting that, other countries, even very gender-positive legislation failed to become effective as females were either reluctant or unable to enforce compliance out of fear that doing so would expose them to sanctions that would reduce their overall welfare (World Bank 2001).

The ultimate impact of such legislative change is thus an empirical issue. In fact, a range of progressive legislation in India that aimed to modify undesirable social practices such as dowry or caste discrimination that has been ineffective in practice (Anderson 2003) provides reason for caution. In a recent study Roy (2008) compares Hindu and non-Hindu women based on their marriage timing to examine the impact of the HSAA on female empowerment, proxied by three self-reported indicators of social and economic autonomy using the National Family Health Survey. While exploring the same question, our approach is substantively different because we are able to shed light on the underlying mechanism as well as explore potential impacts over a range of dimensions that include actual inheritance, age at marriage, and girls' education over different generations of individuals. We achieve identification by comparing (i) the likelihood of inheriting land by females and males in the same household before and after the HSAA came into force; (ii) age at marriage, as a proxy of bargaining power, by females and males in the same household who married before or after the coming in force of the HSAA; and (iii) educational attainment of different cohorts of females and males in the same household depending on whether their educational decisions were completed before or after the coming into force of the HSAA. Methodologically, we use household-level fixed effects, and gender specific year of birth fixed effects to eliminate potential bias due to unobserved household characteristics or time varying factors affecting outcomes of males and females, and perform a number of placebo tests to check the underlying parallel trends assumption throughout.

### **3 Conceptual Framework**

Our empirical strategy is based on the application of a conceptual framework of intergenerational transfers of physical and human capital from parents to their children. As in the wealth model of transfers (Becker 1981; Becker and Tomes 1979), we be-

gin by assuming that parents are altruistic, and collectively maximize a utility function, in which parents utility depends on consumption of parents ( $C_t^p$ ), and the future consumption of the daughters ( $C_{t+1}^d$ ) and sons ( $C_{t+1}^s$ ), that enter additively separately into the utility function.<sup>14</sup> More specifically, the parents utility function is of the form  $U(C_t^p) + \beta[\delta^p U(C_{t+1}^d) + (1 - \delta^p) U(C_{t+1}^s)]$  where  $\delta^p$  is the weight given by parent to the daughter's utility and  $\beta$  is the discount factor. For simplicity, we assume that parents have one daughter and one son. In a more general model, the number of children would be a choice variable. The consumption of the child is given by  $C_{t+1}^i = wE_{t+1}^i + F(E_{t+1}^i, A_{t+1}^i) - \mu$ ,  $i = d, s$  and the consumption of parents is  $C_t^p = \sum_{p=m,f} wE_t^p + \sum_{p=m,f} F(E_t^p, A_t^p) - \sum_{i=d,s} \theta E_{t+1}^i$  where  $A$  represents inherited physical assets such as land,  $E$  represents number of years of schooling,<sup>15</sup>  $w$  is the wage rate,  $\theta$  is the cost of a unit of education and  $\mu$  represents expenditure incurred by sons and daughters on the education of their own children.<sup>16</sup>  $F(\cdot)$  represents farm income, that is increasing in both arguments and the cross derivatives are assumed to be positive. Parents collectively obtain the optimal investments in human capital and asset transfers to sons and daughters.

For the model to be consistent with the data,  $\delta^p$  must be lower than 0.5 (egalitarian solution).<sup>17</sup> For a sufficiently low  $\delta^p$ , before the reform, sons receive land bequests and an education level that is higher than that of daughters. However, after the reform, daughters and sons receive equal shares of land bequests. Given that daughters are now

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<sup>14</sup>Traditional models of family behavior assume that family members act as if they are maximizing a single utility function. The common preference ordering may be an outcome of consensus among the family members (Samuelson 1956) or the preferences of a dominant family member (Becker 1981). Other models have challenged this unitary or common preference approach and have attempted to incorporate divergent and conflicting preferences of individual family members into economic analysis. The allocation mechanism in these individual utility models include cooperative bargaining (McElroy and Horney 1981); non-cooperative bargaining (Kanbur and Haddad 1994) and a generic collective approach that avoids specifying a particular model of intra family allocation but assumes that family allocations obey a pareto efficient sharing rule satisfying certain regularity conditions (Chiappori 1988, 1992).

<sup>15</sup>Labor income and farm income are assumed to be functions of efficiency units of labor where individuals devote a fixed proportion of their time to each activity. In an extended model, time devoted to each activity could be a choice variable.

<sup>16</sup>For simplicity, we assume  $\mu$  to be exogenous to the parent's problem. The expectation of parents on educational expenditure incurred by their children on the education of their grandchildren could be instead be included in the model.

<sup>17</sup>If parents care equally about sons and daughters, they would educate daughters more, before the reform, to compensate for the lower levels of land bequest. However this is not what we observe in the data. Within household comparisons of education levels suggest that the schooling attainment of women who did not inherit land are on average lower than the schooling attainment of men with positive land bequests. This would be consistent with  $\delta^p$  being lower than 0.5.

receiving land, education of the daughters becomes relatively more important because their education now not only increases labor income but it also increases farm income. If the marginal farm income generated by education is high enough, one would observe a relative increase in daughters education after the reform.<sup>18</sup>

However, one could extend the model where parental allocation rules may be modified by disagreement between parents and also by non-altruistic transfer motives. Parents may have different objectives that motivate transfers to children. Such decisions may be based on future returns that the children would bring to them (Bernheim, Schleifer, and Summers 1985), preferences for inter-sibling equality (Behrman, Pollak, and Taubman 1982) or trade-offs between equity and efficiency (Pitt, Rosenzweig, and Hassan 1990). Furthermore, if parents disagree, or if they do not pool their incomes, the common preference model with a single parental utility function specified above may not hold, and the outcome of the allocation is the result of bargaining between parents (McElroy and Horney 1981). While the unitary model presents a useful starting point, there is mounting empirical evidence against the income pooling property.<sup>19</sup> Recent empirical evidence suggests that the restrictions imposed on demand functions by common preference models are not well-supported.<sup>20</sup> Rejections of the family income pooling assumption have been

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<sup>18</sup>To see this more clearly, we solve the model numerically by assuming functional forms for the utility and the production function. For simplicity, we parameterize the functions by assuming log utility, and a Cobb Douglas production function with constant returns to scale ( $E^\alpha * A^{1-\alpha}$ , where  $\alpha=0.5$ ). Further assume that wage rate =1. For this example, let us consider a household that has one unit of asset and  $\delta^p=0.25$ . Under these assumptions, before the reform, the educational attainment of the sons is 0.39 years, while the educational of the daughters is 0.03 years. After the reform, with equal division of land, the education to the daughters increases to 0.05 closing the education gap. Different combinations of parameter values provide qualitatively similar results.

<sup>19</sup>An ideal test of the pooling hypothesis would be based on an experiment where there is a permanent exogenous change in the income received by husbands or wives that happens after household formation. The difficulty with comparing demand patterns based on earned and unearned income received by the husband or wife is that earnings are clearly endogenous with respect to the household's time allocation decisions, so that households with different ratios of wife's earnings to husband's earnings are likely to face different prices and may have different preferences. Instead if one of the household members experiences a permanent exogenous shock in non-labor income (e.g., unexpected bequests), in the unitary model, this would affect household patterns only through the increase in household non-labor income. As pointed out in the literature, in the collective model, this may also affect consumption patterns through a modification of the household members weight in the optimization problem of the household (because it increases its outside option, and hence the reservation utility).

<sup>20</sup>Tests of the unitary model of the household include investigating whether the identity of the recipient (e.g. gender) of a permanent shock in non-labor income affects its use. Lundberg, Pollak, and Wales (1997) study the effects of a change in the mode of allocation of child benefits in the UK, from a tax credit to a direct payment of to the mother. This transfer 'from the wallet to the purse' seems to have been associated with an increase in the consumption of women's and children's clothing relative to men's

most influential in weakening economists' attachment to unitary models.

Like other household allocation outcomes (Thomas 1990, 1994), intergenerational transfers may reflect individualistic preferences of husband and wife in decision-making, and thus the differential bargaining power of parents may influence the allocation of land and education to children. Stronger inheritance rights to women, after the reform, are likely to improve her outside options thereby generating greater bargaining power within marriage that increases her influence over intrahousehold allocation of resources. If husband and wife have different preferences ( $\delta$ ) over daughters (and sons), and if mothers' value daughters education more than the father, then after the reform, one might observe a relative increase in the educational attainment of the daughters.

## 4 Data and Estimation Strategy

### 4.1 Data and Hypotheses

We use data from the 2006 round of the nationally representative Rural Economic and Demographic Survey (REDS) conducted by the Indian National Council for Applied Economic Research. In addition to information included in standard multi-purpose household surveys, the REDS contains data on the household head's parents (generation I), heads siblings (generation II), as well as head's children (generation III), providing us with a quantitative measure for inter-generational transfers of key assets. We focus on Maharashtra and Karnataka and, as our strategy relies on within household variation, drop the few non-Hindus (3 percent of the sample) in these two states to obtain a sample of 1,371 households with 10,565 individuals in three generations for the analysis. While our main results use data from these two states, we present additional robustness checks using data from five north Indian states that did not amend the Act in 1994.<sup>21</sup>

For all males and females in generation II we observe information on basic individual attributes (e.g., age, education, number of children, year of marriage), spousal characteristics in households with children.

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<sup>21</sup>We use a sample of 2810 rural Hindu households from Uttar Pradesh, Rajasthan, Bihar, Madhya Pradesh, Orissa, primarily to perform additional specification checks. The North Indian states did not amend the Hindu Succession Act until the national amendment in 2005.



istics, land bequests, and whether-and if yes when-the generation I male had passed away. This allows us to use variation between brothers and sisters within the same household, depending on whether their father died before or after the HSAA became effective, to assess impacts of legal changes. Information on actual amounts of land inherited by males and females at the time of father's death, allows us to identify the impact of the 1994 amendment from the fact that legal changes affected the likelihood of receiving inheritance for females but not for males.

We use inheritance of land for three reasons. First, in contrast to other assets, land is joint family property so that its inheritance follows the (amended or original) HSA which cannot be modified through a will. Second, information on whether or not land was inherited by individuals is easily obtained via recall and will be less noisy than other variables relating to inter-generational asset transfers. Moreover, in rural India, land continues to be the main asset and source of livelihood, status, and social security; in fact, for land owning households in our sample, it accounts for almost two thirds of total asset value.<sup>22</sup>

Figure 1 plots the density distribution of birth years, illustrating that the average (notional) age for the 1371 members of generation I, the 6451 members of generation II, and the 2743 members of generation III is 80, 49, and 23 years, respectively.<sup>23</sup> Of generation I males, 318 are still alive, 641 died before 1994 such that succession followed the provisions of the 1956 HSA, and 412 after 1994 so that the HSAA's provisions were applicable.<sup>24</sup> Formally, the estimation equation (for generation II individuals) is:

$$Y_{gkj} = \alpha_1 + \alpha_2 F_{gk} + \alpha_3 F_{gk} * D_j + \alpha_4 \mathbf{X}_{gkj} * F_{gk} * D_j + \gamma_j + \mu_{gk} + \epsilon_{gkj} \quad (1)$$

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<sup>22</sup>Since the data are collected retrospectively, reporting bias is a valid concern. However, questions on inheritance were not asked within the context of the inheritance reform. In other words, the head of the household was not reminded about the inheritance law. On average, the reports by the head of the household are similar to women's own reports of the land bequests that they received. We also find that the reported timing of father's death looks reasonable smooth (results available from the authors). Moreover, in the second stage, we would not expect to find an education effect if the results were driven by reporting bias.

<sup>23</sup>For generation I members that are dead by 2006, we compute their hypothetical age in 2006.

<sup>24</sup>Of 1371 generation I females, 30 percent are alive in 2006, 33 percent died before 1994, and 37 percent died after 1994. Approximately 3 percent of generation I females own land, and 90 percent are illiterate. There is approximately zero inheritance from generation I females to generation II individuals and including mothers status or landholding makes no difference to the main results.

where  $Y_{gkj}$  is an indicator variable for whether individual of gender  $g$ , born in year  $k$ , in household  $j$  inherited any land,  $F_{gk}$  and  $D_j$  are indicator variables for females and whether or not the father died after 1994 when the HSA had been amended,  $\mathbf{X}_{gjk}$  is a vector of parental and household characteristics that includes education, caste and land holding, and  $\gamma_j$  are household fixed effects to control for time invariant household characteristics. We include a complete set of gender specific year of birth fixed effects ( $\mu_{gk}$ ) to control time varying aggregate factors that might independently affect relative inheritance patterns by males and females. The coefficient of primary interest is  $\alpha_3$ , the estimate of the amendment induced increase in females' likelihood to inherit land.

To provide an additional robustness check and allow potential impacts of the HSAA to vary over time, e.g. because of the time required to disseminate the law or for households to understand its implications, we also estimate specifications where  $F_{gk} * D_j$  is further interacted with indicator variables for the year of death of generation I male. In addition, we test the robustness of our results by conducting placebo tests based on hypothetical reforms to examine whether our estimates are mistakenly picking up other unobserved factors, e.g. trends in inheritance between households whose generation I male died before or after 1994, that are independent of legal provisions, equivalent to a test of the parallel trends assumption.

Even in cases where actual inheritance has not yet occurred, the fact that a woman can expect to inherit land or other property from her parents may increase her bargaining power. Stronger inheritance rights are likely to improve a woman's marital prospects with important implications for her subsequent life outcomes. For instance, characteristics of a woman's spouse, and his family, her age at marriage have been shown to have significant effects on domestic violence, reproductive decisions, and her social status in her husband's home (Field and Ambrus 2008, Mobarak, Kuhn and Peters 2007, Jensen and Thornton 2003).<sup>25</sup> In India, early marriage has been shown to be associated with lower educational

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<sup>25</sup>In recent economic literature, dowry is viewed as pre-mortem bequests where parents transfer their inheritance to daughters at the time of marriage. In particular, if there are institutional or legal barriers to women's ability to inherit property, especially in virilocal societies, dowry may emerge as a culturally sanctioned method of bequest (Zhang and Chan 1999, Botticini and Siow 2003). In such a scenario, the Hindu succession act presents an interesting case, as it removes an institutional barrier of transferring joint property to daughters and recognizes women as coparceners. However, the survey does not collect

attainment, higher maternal mortality, and high levels of child malnutrition (Caldwell et al 1983). Using the generation II sample of men and women allows us to apply the same strategy as in equation (1).

A potential concern with our specification is that fathers who know that their daughters will inherit greater amounts of physical wealth at their death may reduce the amount of education they provide to daughters as compared to sons. This is relevant because human capital, in the form of education, is a key way to transfer wealth across generations. If girls have a comparative advantage in human capital rather than land-intensive economic pursuits (Quisumbing et al 2001), compliance with the letter but not the spirit of the HSAA, through a commensurate reduction of the amount of education transferred to girls, could potentially make women worse off. To account for this possibility, analysis of intergenerational transfers of human capital, in addition to those of land, will be useful. It has the added advantage of being able to include households where the generation I male is still alive.

We do so by analyzing the level of educational attainment by generation III individuals and compare relative changes in the level of female and male educational attainment between cohorts who completed educational decisions before and after the HSAA. As the educational decisions of generation II individuals had mostly been completed by the time the HSA had been amended, the only viable way of exploring potential human capital effects is to focus on elementary education of generation III individuals whose (expected) inheritance is not (yet) observed. We focus on elementary education of girls and boys who were less than 6 years old in 1994 so that their decisions would have been affected by the HSAA as compared to those who were 13 years or older in 1994 implying that, children who are 13 years or older would have completed their elementary education by then, and their schooling decision would not be affected by the Act. Children who were 6-12 years old in 1994 are excluded to avoid contamination of results as grade repetition and delayed school entry could lead to a few older girls to potentially benefit from the legal change (leading to a downward bias in the estimation if they are mistakenly considered

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credible dowry data that would enable us to measure the dowry response to this legal amendment, but this is certainly an area for future work.

as non-treated).<sup>26</sup> The equation to be estimated then becomes:

$$E_{gkj} = \alpha_1 + \alpha_2 F_{gk} + \alpha_3 F_{gk} * D_j + \alpha_4 \mathbf{X}_{gkj} * F_{gk} * D_j + \gamma_j + \mu_{gk} + \epsilon_{gkj} \quad (2)$$

where  $E_{gkj}$  measures the years of schooling of individual of gender  $g$ , born in year  $k$ , in household  $j$ ,  $F_{gk}$  is an indicator variable for females and  $D_j$  now refers to an indicator variable indicating that the individual was less than 6 years old in 1994. All other variables are defined as above.

## 4.2 Descriptive Statistics

Table 1 presents descriptive statistics for each generation of individuals to illustrate the key variables used in our empirical analysis. Panel A refers to the 1371 male members of generation I, 23 percent of who are still alive, and 47 percent and 30 percent of who had died before or after the HSAA came into force in 1994, respectively. The importance of land is illustrated by the fact that for the 75 percent of households who owned land in generation I, land made up almost two thirds (59 percent) of total wealth.<sup>27</sup> While differences in age and associated characteristics are in line with expectations, none of these characteristics are statistically significant different between those who died before and after 1994.<sup>28</sup>

Panel B provides data on 6,451 generation II individuals, separately for males and females. There are significant differences in educational attainment between males and females that are also reflected in the education by females' spouses. Similarly, while 53 percent of individuals have inherited land, very few (5 percent of males and 3 percent of females) had received inter-vivos transfers. Interestingly, more than two thirds (67 percent) of males, compared to 11 percent of females whose father had died before 1994

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<sup>26</sup>We have tried using alternative cutoff points to examine the sensitivity of our results and we find that the results are qualitatively similar (results available from the authors).

<sup>27</sup>Value of assets for each household is computed from current (2006) values (in Rs.) of all residential and commercial property, land ownership, jewelry, consumer durables, livestock, mechanized, non-mechanized assets, and savings and investments in financial institutions as reported by the household head.

<sup>28</sup>Approximately 10 percent of the 1400 sampled households have a female head. When the head is female, data is collected on the siblings and parents of her husband. We are therefore able to construct three generations pertaining to her husband's family for the purpose of our analysis.

inherited any land. As this is also an explicit contravention of the 1956 HSA which requires inheritance by females, albeit of a smaller share than by males as they are not coparceners, it suggests that legal provisions are not always adhered to. Using the fact that 15 percent of males and 12 percent of females were married after 1994, we can also split the sample into those who married before and after 1994, indicating little difference in this variable. This would be consistent with the notion that (i) the majority of wealth is transferred at the time of father's death rather than in the form of inter-vivos transfers and (ii) parents are averse to the inequality that would arise of following the letter of the law.

Beyond that, we find few significant differences in individual characteristics that are determined before marriage and that will not be correlated with age effects. At the same time, information on key attributes of the current household (i.e. the education by the spouse and number of children) may point to at least some impact of the legal changes although these may still be driven by unobservables, requiring us to analyze in more detail using within-household variation and controlling for confounding factors. For instance, comparing spouse's education (or number of children) of generation II individuals using the same strategy as above is likely to lead to biased results because the spouse's of generation II men are likely to have been beneficiaries of HSAA. Such potential general equilibrium effects would make generation II men and women comparisons of certain marriage market outcomes potentially problematic. However, analyzing age at marriage of generation II men and women represents a potentially clean outcome variable as identification would rely on the plausible assumption that in the absence of the reform there would have been no differential changes to the age at marriage of men and women over this time period. Panel B shows that the average age at marriage for generation II males is 21.5 years, remarkably close to the legal age at marriage for men, while that of females is 16.8 years that is significantly lower. Interestingly, we find that the average age at marriage for both men and women rises by approximately 3 years for marriages occurring after HSAA. How much of this can be attributed to the HSAA as compared to broader social trends is a question that requires econometric analysis.

Panel C of Table 1 presents information on educational attainment by generation III individuals in 1994. Three age groups, based on the likelihood that these individuals' decisions on primary education may be affected by the passage of the HSAA are distinguished. First, primary education decisions for those between 0 and 5 years in 1994 would have been made after the amendment had come into force. By comparison, decisions for 13-18 years olds in 1994 would, under the assumption of elementary education being completed by age 13, all have been made before the HSAA had come into force. We thus define the 'treated' group as individuals who were less than 6 years old in 1994. These individuals satisfy two important conditions. First, they are young enough to respond to HSAA and begin their schooling investments after the reform, and second, they are old enough that we do observe their elementary school education in the 2006 REDS data.

The potential for spillovers raises the question of whether males are a valid control group. Our assumption is that HSAA has a direct effect on only female schooling. However, HSAA could have a spillover effect on males if an increase in girl's education induced an increase in boy's education (positive spillover) or family budget constraint causing an increase in girls education crowds out her brother's education (negative spillover). While the (mean) differences in educational attainment of males in the two age cohorts is miniscule in Panel C, we do find that females in the younger cohort had slightly higher educational attainment than the older cohort. We also estimate the impact on educational attainment of younger and older cohorts separately for girls and boys to determine the extent to which our use of males as a control group drives the result. The coefficient on the young (0-5) cohort for the males-only regression is positive and insignificant, suggesting no dramatic effects of HSAA on educational attainment of boys. In contrast, the coefficient on the young cohort in the females-only regression is twice as high as the coefficient in the males only regression and is statistically significant (results available from the author) providing circumstantial evidence in support of using males as a valid control group. Furthermore, state level education policies are especially of interest because our outcome variable is schooling. If such policies had gender or cohort effects, these would not bias our estimates which use gender-cohort variation. The identification would only

be threatened if state level education policies had gender specific effects that varied by cohort in a manner correlated with HSAA. It is hard to imagine alternative policies in Maharashtra and Karnataka that specifically effected educational attainment of younger cohorts of girls but had no corresponding effect on boys in a manner correlated with HSAA.

## 5 Empirical Results

### 5.1 Land Inheritance

Results from different specifications of a linear probability model of equation (1) for the 4,487 individuals in 932 land owning households where generation I male was deceased are presented in Table 2. In addition to a basic specification (column 1), we present results exploring time varying effects of HSAA (columns 2 and 3), their dependence on households' initial endowments and caste (column 4 and column 5), or variation with year of marriage (column 6). These are complemented by a placebo test for a hypothetical legal change in 1982 rather than 1994 in column 7, and for alternative time periods in Figure 2. Gender specific year of birth fixed effects as well as household fixed effects are included throughout.

The basic result in column 1 of Table 2 suggests that females are significantly less likely (by 71 percent) to inherit land than males. Females whose father died after the HSAA had become effective in 1994 are 22 percentage points more likely to inherit land than those whose father died before 1994. It points towards a clear and relatively large impact of the HSAA on increasing females' likelihood to inherit land although the legal change alone was insufficient to completely compensate for females' underlying disadvantage. To allow for the possibility that learning increases the effect of the legal change over time and to check the robustness of our results, we include additional pre and post binary variables that indicate the occurrence of death immediately preceding or following 1994. This allows us to differentiate between a level and a trend effect of the reform. Specifically, in columns 2-3, pre 1-6 years is a indicator variable for whether death (and thus inheritance) occurred

immediately before (1988-93) or after (1994-1999) the legal change or with some lag (i.e. from 2000 onwards). Results indeed point towards no effect pre-reform, thereby increasing our confidence in this being a causal effect. At the same time, we find a slightly lower point estimate (20 percent compared to 29 percent) in the first as compared to the second post-amendment period which may be due to diffusion leading to increased knowledge of the act. Results from the relevant tests illustrate that we can reject equality of coefficients between pre and post and between the first and second post-reform periods but that even in the second period, the HSAA failed to compensate for the anti-female bias inherent in land inheritance in India.<sup>29</sup>

To explore heterogeneous effects of the reform by parental background, we include interactions of the treatment variable with the level of education, land endowment and caste of generation I male in column 4-5. Interestingly, reform effects are estimated to be slightly more pronounced for SC/ST households and for households with lower amounts of land that might be reflective of the availability of other resources of substitution.<sup>30</sup> Legal provisions clearly imply that the HSAA applies only to females who married after 1994 but not earlier.

To test the extent to which this has been enforced, we include an indicator variable for marriages post 1994 and its interaction with female in column 6. The lack of significance of the coefficient on the relevant variable suggests that the date of marriage matters less than the date of inheritance. At the same time, the coefficient on the female\*death interaction remains virtually unchanged, suggesting that asset ownership is affected more by actual inheritance than a hypothetical entitlement and that there are not too many inter-vivos transfers.

To test whether our coefficient estimates are mistakenly picking up trends in inheritance that were independent of legal rulings, column 7 reports results from a placebo test that applies the same estimation strategy as above but sets the date of the reform

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<sup>29</sup>The F statistic for equality of pre and post coefficients is 32.28 ( $p=0.00$ ), and equality of the two post periods is 3.75 ( $p=0.05$ ), suggesting that the coefficients are statistically different from each other.

<sup>30</sup>This result is also consistent with the findings of Luke and Munshi (2007) who suggest that lower caste households are perhaps more receptive to new opportunities and have a stronger incentive to move away from traditional norms to a more modern economy. An interesting extension for future work could be to use detailed information on subcaste to measure the interaction of inheritance norms and laws.



to 1982 rather than 1994. While the strong anti-female bias persists, the coefficient on the female\*death interaction is insignificant and even negative, suggesting that, within the same household, the likelihood of daughters, relative to sons, to inherit land did not change depending on whether the father died before or after 1982.

Figure 2 provides a plot of estimated coefficients on the  $Fik * Dj$  interaction with father's year of death, together with the 95 percent confidence interval to explore potential variation over time in the size of the estimated effect of the HSAA. Before 1994, coefficients fluctuate around zero, and are statistically insignificant throughout. There are no detectable changes before the legal amendment, with a sharp acceleration in land bequests to daughters occurring only after the amendment of the act in 1994 that tends to persist, suggesting that the timing can be considered plausibly orthogonal to trends in woman's inheritance. As can be seen the effect also shows a modest but statistically significant increasing trend thereafter. This graph lends support to the identification strategy and the consequent validity of the effect of the HSA amendment.

Table A1 presents additional robustness checks by estimating equation (1) for the sample of Hindu households in alternative states that did not amend the act in 1994 (columns 1-3). While significant female bias exists, there is no additional gain in females' likelihood to inherit if her father died after 1994. Similarly, in columns 4-6, estimating the above equation for non-Hindu households in Maharashtra and Karnataka, we do not find any gain in female's likelihood to inherit after 1994, lending support to our main effect.

Overall, the results indicate that the HSAA significantly increased females' likelihood to inherit land. From a substantive point of view, it is worth noting that, while we find a significant increase in female land inheritance, full gender equality in land inheritance remains a distant goal even after legislative reform. To the extent that the positive time trend of the estimated effect can be interpreted as a result of learning by the affected households, this would suggest that, especially after the national extension of the HSAA in 2005, dissemination of the changed legal provisions might be desirable.

## 5.2 Age at Marriage

Table 3 shows the results from estimating equation (1) for the 5900 ever married generation II males and females whose marriages occurred before and after the HSAA came into force. However, additionally, we match individuals based on the father's status. We do this because generation II females whose fathers died before 1994 are unlikely to have been beneficiaries of the reform. On the other hand, generation II females whose fathers are alive or died after 1994, are likely to experience stronger inheritance rights after the reform that could lead to an affect on their marriage market outcomes. It is important to note that generation II's mother (or widows) were not considered coparceners after the reform. Thus, the status of the widow is unaffected after the reform, which makes comparisons of generation II females based on the father's status a robust way to parse out differential effects of stronger inheritance rights on females's marriage market outcomes.

In columns 1-3, we compare the age at marriage for generation II males and females whose fathers have died before 1994. The basic result suggests that after controlling for gender specific year of birth and household fixed effects, females have a significantly lower age at marriage than males. On average, female age at marriage is 3.36 years lower than males. Interestingly, females who married after 1994 (but whose fathers have died before 1994) have no additional effect on their age at marriage. The coefficient on the female\*married interaction is small and insignificant, suggesting that, within the same household where father had died before the reform, the age at marriage of daughters, relative to sons, did not change depending on whether the marriage occurred before or after 1994. This result supports the prediction that females whose fathers have died before 1994 have not benefited from the reform and does not lead to an increase in their inheritance rights leading to an affect on their marriage market outcomes.

However, in columns 4-6, females who married after 1994 (but whose fathers have died after 1994) have a significantly higher age at marriage (by 0.54 years) than females who married before 1994. This points towards a clear and positive impact of HSAA on increasing age at marriage for females whose marriages occurred post HSAA. Recent studies (Jensen and Thornton 2003, Field and Ambrus 2008) suggest that large improvements in

women’s wellbeing may be achievable with even small increases in female age at marriage suggesting that the relatively modest magnitude of the impact of half a year could potentially be associated with significant improvements in women’s socio-economic status in India.

To explore the extent to which estimated effects may be driven by parental background, we include interactions of the treatment variable with the level of education and land endowment of the father in column 2. Reform effects appear to increase with father’s level of education suggesting that perhaps awareness and learning of legal changes by the more educated. In light of the view that early age at marriage is a substantial barrier to social and economic development in India, our results atleast provide some evidence suggesting a favorable outcome in the marriage market for females which could potentially generate wider implications for both maternal and child health outcomes in the future.<sup>31</sup>

In Table A2, we estimate the effect of the HSAA on spousal characteristics (measured by spouse’s education) and number of children using a slightly different estimation strategy to reduce the bias of general equilibrium effects. Specifically, we compare outcomes of females in treatment and control states who married before or after 1994. We find a negative and significant effect on number of children and a positive and significant effect on spouse’s education, suggesting favorable effects on females’ marriage market outcomes along a broader set of dimensions. Of course, a caveat is due, as the control states are significantly different from Maharashtra and Karnataka along several observed and unobserved characteristics, yet the finding of favorable effects, after controlling for state specific year of birth and household fixed effects is suggestive of positive implications for females after the reform.

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<sup>31</sup>To the extent that women who own property, e.g. land, have a stronger fall-back position outside marriage (outside option) and therefore greater bargaining power within it as compared to landless women, could be reflected in greater autonomy in household choices. Ownership of land by a woman can also have indirect impact on her bargaining power via her monetary contribution to household expenditure, even aside from being regarded more highly by society in general and hence within her family as well (Agarwal 1994). To understand whether the woman enjoys better status in her marital family if she brings into her marriage the (potential) possibility of inheriting permanent property from her parental family is of considerable interest and something that we hope to explore in detail in future work.

### 5.3 Educational Attainment

Results from estimating equation (2) for generation III males and females are reported in Table 4 for the basic regression (column 1), specifications with interactions for initial land ownership and education by the household head (column 2), and caste (column 3) to assess whether such effects varied by socio-economic status, and a placebo test (column 4). We find that, after controlling for household fixed effects and gender specific year of birth dummies, girls' level of elementary schooling is 1.6 years less than that attained by boys. At the same time, the female\*young cohort variable is highly significant and positive, suggesting that girls whose educational decisions were made after the changed inheritance regime came into force had 0.3 years more of elementary schooling than the older cohort. Effects are estimated to not differ significantly by father's landlessness or level of education or caste, suggesting that effects are relatively uniform across the socio-economic spectrum. To explore whether our estimates mistakenly pick up broader trends in educational attainment that are independent of legislative provisions, we present the results on educational attainment using only the older cohorts in 1994, i.e. using males and females aged 13-24 years old in 1994 whose elementary educational decisions have been made before the reform in column 4, suggesting that there is no corresponding increase in the educational attainment of older cohorts of girls in 1994.<sup>32</sup>

Interestingly, the estimated effect is quantitatively similar to what has been in the literature on other programs. For instance, school feeding, deworming, and conditional cash transfer schemes in developing countries which, due a randomized roll-out, have been amenable to rigorous evaluation, have been shown to lead to program effects in the range of 0.1 to 0.6 years. Although adjustment is required for the fact that the educational impacts of inheritance reform will not be instantaneous, the large estimated effects, together with the limited cost of such reform imply that changing inheritance legislation is a potent mechanism to improve not only women's asset ownership but also human capital accumulation by the next generation.

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<sup>32</sup>Estimating equation (2) for the non-Hindu households in our sample (placebo test) does not lead to any corresponding increase in girls educational attainment, thereby strengthening the validity of the estimated impact of the amendment (results available from the authors).

There could be two potential mechanisms leading to a positive and significant effect of HSAA on educational attainment of girls. First, to the extent that girls' asset ownership and educational attainment are complements rather than substitutes, parents may have an incentive to provide both in equal measure. Second, improved educational outcomes of generation III girls could be the result of intrahousehold bargaining. With differential preferences for men and women, stronger inheritance rights could increase women's bargaining power leading to an increase in their daughters' educational attainment. Unfortunately, neither the generation III girls' mother's level of asset ownership nor whether the mother's father is still alive (if not when he passed away) are observed, preventing us from exploring the underlying mechanisms more directly.<sup>33</sup> However, using a proxy of bargaining power, measured by age at marriage of the mother, shows no differential effects on generation III girls' education (in column 4 of Table 4) providing suggestive evidence in favor of complementarities. A caveat is in order when interpreting these results, as an ideal test would involve estimating the impact on children's schooling based on the inheritance patterns of both parents. However, the use of generation III girls' mother's age at marriage, given the lack of survey information on mother's father, provides evidence in support of complementarities between land and schooling within this context.

## 6 Conclusion

While developing countries continue to make considerable progress to equalize economic opportunities for women, inheritance legislation remains, in many cases, strongly biased against women in a way that may seriously reduce equality, especially in rural areas. Reform of inheritance laws in India, in the form of state-level amendments to the Hindu Succession Act, provide an interesting natural experiment to explore whether and to what extent such efforts have been effective, thus providing potentially important lessons for India (where similar changes have been made, in 2005, on a national scale), and for other

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<sup>33</sup>The REDS survey does not contain information on the father of the wife of the household head (when the head was male) nor information on the father of the head of the household when the head was female, thus restricting our ability to shed light on the underlying mechanism that mediates the increase in girls education after the amendment.

countries where inheritance rights remain severely biased against women.

A unique dataset containing comprehensive information on demographic characteristics, patterns of inheritance and asset ownership over three generations of individuals allows us to examine intergenerational transfers of physical and human capital following amendments in inheritance legislation in India. We find that the HSAA significantly increased women’s likelihood to inherit land, although it did not fully compensate for the underlying gender inequality. At the same time, the finding of a significant increase in girls’ educational attainment after the HSAA suggest that the Act led to genuine improvement in women’s socio-economic status, rather than a substitution away from human capital to physical capital transfers by parents to their daughters following the legislative amendment.

While this paper provides robust evidence on the impact of changes in inheritance legislation, it is not clear whether strategic behavior on the part of parents in terms of substituting property away from joint to separate could potentially disinherit daughters, leading to an adverse affect on women’s asset ownership. Moreover, in recent economic literature, dowry is viewed as pre-mortem bequests where parents transfer their inheritance to daughters at the time of marriage. In particular, if there are institutional or legal barriers to women’s ability to inherit property, especially in virilocal societies, dowry may emerge as a culturally sanctioned method of bequest. In such a scenario, the Hindu succession act presents an interesting case, as it removes an institutional barrier of transferring joint property to daughters and recognizes women as coparceners. If credible dowry data are available, future research could accurately measure the dowry response to this legal amendment. Further micro-level research to explore the role of information dissemination, and potential mechanisms that would help in enforcing legal arrangements, would also be of relevance.

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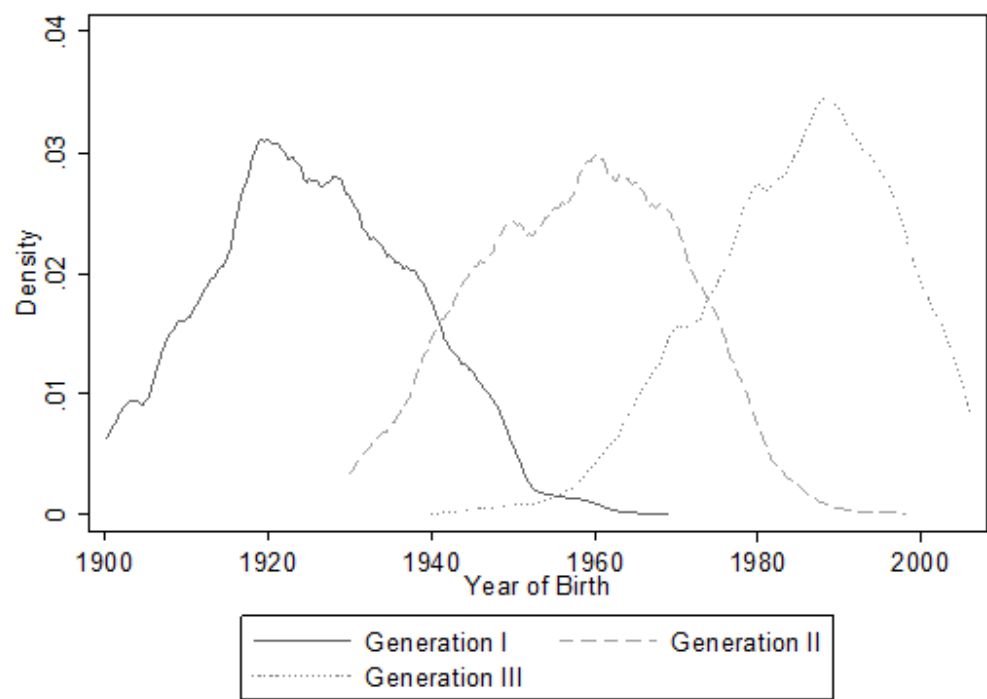


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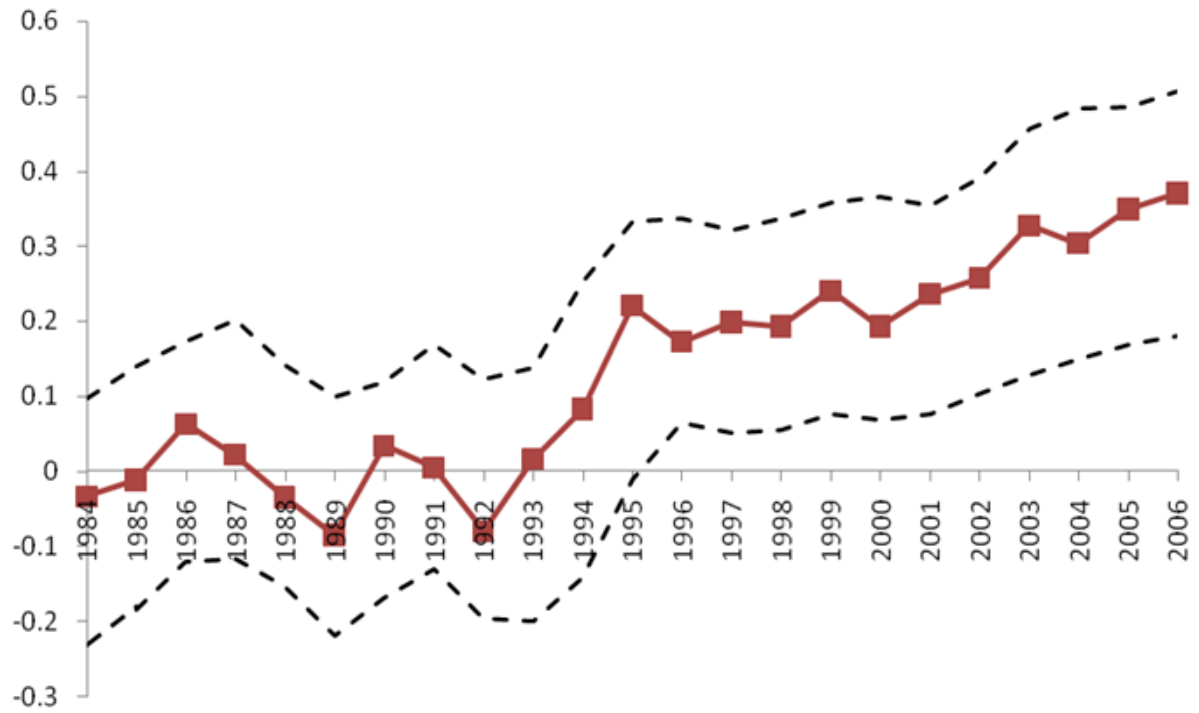
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Figure 1: Age Distribution Across Generations



**Figure 2: Estimated Effect Over Time**  
 (Coefficients with 95% Confidence Interval on the Interaction of Daughter\*Year of Death of the Father)



**Table 1: Household Characteristics**

	Total Sample	Father Alive	Father Dead	
			Died Before 1994	Died After 1994
<b>Panel A: Generation I</b>				
Year of Birth	1927	1940	1920	1932
Land Ownership (%)	0.75	0.72	0.74	0.77
Years of Schooling	1.78	1.83	1.76	1.82
Spouse's Education	0.78	0.83	0.74	0.83
Number of Male Children	2.25	2.24	2.2	2.36
Number of Female Children	2.13	2.22	2.13	2.12
No of observations	1371	318	641	412
<b>Panel B: Generation II</b>				
<b>Men</b>				
Year of Birth	1956	1962	1950	1961
Years of Schooling	4.76	4.75	4.78	5.22
Unmarried in 1994 (%)	0.15	0.27	0.07	0.18
Inherited any land (%)	0.53	0.05	0.67	0.7
Spouse's Education	2.71	2.97	2.35	2.50
Number of Children	2.50	2.51	2.42	2.57
Age at Marriage	21.52	20.78	21.55	21.45
No of observations	3721	842	1451	1171
<b>Women</b>				
Year of Birth	1959	1964	1954	1962
Years of Schooling	2.73	2.91	2.71	2.74
Unmarried in 1994 (%)	0.12	0.23	0.07	0.13
Inherited any land (%)	0.17	0.03	0.11	0.33
Spouse's Education	4.74	4.78	4.64	5.02
Number of Children	2.45	2.45	2.25	2.76
Age at Marriage	16.88	16.93	16.81	17.03
No of observations	2730	611	1010	855
<b>Panel C: Generation III</b>				
<b>Men</b>				
Year of Birth	1982	1991	1979	1986
Aged 0-5 in 1994 <sup>a</sup>	4.41	4.72	4.32	4.75
Aged 6-12 in 1994 <sup>a</sup>	4.40	4.48	4.27	4.43
Aged 13-18 in 1994 <sup>a</sup>	4.37	4.31	4.23	4.42
No of observations	1487	311	756	420
<b>Women</b>				
Year of Birth	1983	1992	1979	1986
Aged 0-5 in 1994 <sup>a</sup>	3.75	3.62	3.97	3.96
Aged 6-12 in 1994 <sup>a</sup>	3.33	3.22	3.36	3.26
Aged 13-18 in 1994 <sup>a</sup>	2.85	2.87	2.94	2.96
No of observations	1256	233	673	350

Authors' computations using the NCAER ARIS-REDS 2006 Survey. <sup>a</sup> represents educational attainment of the specified cohort.

**Table2: Effect of the Hindu Succession Act Amendment on the Inheritance of Land**

Dependant Variable:	Any land Inherited						Placebo
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.71 [0.057]***	-0.709 [0.057]***	-0.708 [0.057]***	-0.714 [0.057]***	-0.696 [0.057]***	-0.691 [0.057]***	-0.785 [0.083]***
Female*Father's Death	0.222 [0.027]***			0.28 [0.034]***	0.137 [0.037]***	0.197 [0.046]***	-0.041 [0.055]
Female* Death Pre 1-6 Years			-0.003 [0.040]				
Female* Death Post0-5 Years		0.198 [0.034]***	0.198 [0.034]***				
Female* Death Post6+ Years		0.285 [0.034]***	0.284 [0.035]***				
Female* Death*Father's Education				0.003 [0.002]		0.002 [0.001]	0.002 [0.002]
Female* Death*Father's Landholding				-0.038 [0.009]***		-0.031 [0.010]***	-0.032 [0.024]
Female* Death*SC/ST					0.276 [0.055]***	0.213 [0.057]***	0.124 [0.070]
Female* Death*OBC					0.068 [0.044]	0.056 [0.045]	0.101 [0.052]
Female*Death*Unmarried in 1994						0.136 [0.076]	-0.2444 [0.335]
Observations	4487	4487	4487	4487	4487	4487	2708
R-squared	0.68	0.68	0.68	0.69	0.69	0.69	0.65

Notes: Female is an indicator variable for whether the individual is female. Father's Death is an indicator variable for whether the father of the child died after the amendment of the act, i.e. after the year 1994. Father's Death Pre 1-6 Years is an indicator variable for whether the death of the father occurred in the six years leading up to the amendment of the act. Father's Death Post0-5 Years is an indicator variable for whether the father died in the first five years after the amendment of the act. Father's Death Post6+ Years is an indicator variable for whether the father died in the sixth year after amendment of the act and beyond. Father's education and landholding are continuous variables. SC/ST refers to scheduled castes and scheduled tribes, OBC refers to other backward castes. Unmarried is an indicator variable that takes the value 1 if the child was unmarried at the time of the amendment of the Act, i.e. 1994. All regressions include gender specific year of birth fixed effects and household fixed effects. All pair wise interactions are included but not shown. Robust standard errors in brackets are clustered by village \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 3: Effect of the Hindu Succession Act Amendment on Age at Marriage**

Dependant Variable:	Age at Marriage					
	Father Died Before 1994			Father Alive or Died After 1994		
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-3.367 [0.154]***	-3.357 [0.154]***	-3.348 [0.153]***	-3.358 [0.135]***	-3.356 [0.135]***	-3.364 [0.136]***
Female*Married Post 1994	0.101 [0.269]	0.103 [0.249]	0.149 [0.234]	0.538 [0.263]**	0.631 [0.265]**	0.674 [0.278]**
Female*Married*Father's Education		0.297 [0.315]	0.278 [0.335]		0.305 [0.364]	0.328 [0.353]
Female*Married*Father's Landholding		-0.019 [0.584]	-0.231 [0.656]		-0.341 [0.659]	-0.641 [0.359]
Female*Married*SC/ST			0.746 [0.519]			0.068 [0.742]
Female*Married*OBC			-0.414 [0.403]			-0.329 [0.661]
Observations	2390	2390	2390	3210	3210	3210
R-squared	0.38	0.38	0.38	0.38	0.38	0.38

Notes: Female is an indicator variable that takes the value 1 if the child is female. Married Post 1994 is an indicator variable that takes the value 1 if the child married after the amendment of the Act, i.e. 1994. Father's education and landholding are continuous variables. SC/ST refers to scheduled castes and scheduled tribes, OBC refers to other backward castes. All regressions include gender specific year of birth fixed effects and household fixed effects. All pair wise interactions are included but not shown. Robust standard errors in brackets are clustered by village \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.



**Table 4: Effect of the Hindu Succession Act Amendment on Educational Attainment**

Dependant Variable:	Educational Attainment				Placebo
	(1)	(2)	(3)	(4)	(5)
Female	-1.63 [0.794]***	-1.59 [0.796]**	-1.61 [0.796]***	-1.61 [0.798]**	-1.54 [0.886]*
Female*0-5 years in 1994	0.317 [0.147]**	0.313 [0.151]**	0.312 [0.149]**	0.318 [0.154]**	0.014 [0.214]
Female*0-5 years in 1994*Father's Education		0.001 [0.028]		0.002 [0.029]	0.049 [0.077]
Female*0-5 years in 1994*Father's Landholding		-0.081 [0.307]		-0.085 [0.310]	-0.392 [0.361]
Female*0-5 years in 1994*SC/ST			0.004 [0.334]	0.015 [0.339]	0.291 [0.324]
Female*0-5 years in 1994*OBC			0.022 [0.348]	0.028 [0.351]	0.157 [0.068]
Female*0-5 years in 1994*Mom's Age of Marriage				0.005 [0.186]	0.178 [0.256]
Observations		1151	1151	1151	820
R-squared		0.79	0.79	0.79	0.79

Notes: Female is an indicator variable that takes the value 1 if the child is female. 0-5 years old is an indicator variable that takes the value 1 if the child is 0-5 years old in 1994 and 0 if child is 13-18 years old in 1994. All regressions include gender specific year of birth fixed effects and household fixed effects. Father's education and landholding are continuous variables. SC/ST refers to scheduled castes and scheduled tribes, OBC refers to other backward castes. All pair wise interactions are included but not shown. Robust standard errors in brackets are clustered by village \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

**Table A1: Robustness Check: Effect of the Amendment amongst Non-Hindu Households and North Indian States**

Dependent Variable:	Any Land Inherited					
	Non-Reform States			Non-Hindu Households		
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.86 [0.0252]***	-0.87 [0.0231]***	-0.86 [0.0267]***	-0.51 [0.076]***	-0.524 [0.073]***	-0.541 [0.072]***
Female*Father's Death	0.011 [0.007]	0.009 [0.007]	0.013 [0.006]	0.083 [0.307]	0.082 [0.306]	0.081 [0.307]
Female* Death*Father's Education		0.003 [0.002]	0.002 [0.001]		-0.074 [0.058]	-0.102 [0.085]
Female* Death*Father's Landholding		-0.008 [0.009]	-0.008 [0.010]		-0.055 [0.057]	-0.07 [0.110]
Female* Death*SC/ST			0.003 [0.007]			0.15 [0.145]
Female* Death*OBC			0.006 [0.004]			0.206 [0.147]
Female*Death*Unmarried			0.003 [0.005]			0.236 [0.247]
Observations	6562	6562	6562	234	234	234
R-squared	0.75	0.75	0.75	0.88	0.88	0.88

Notes: Female is an indicator variable for whether the individual is female. Father's Death is an indicator variable for whether the father of the child died after the amendment of the act, i.e. after the year 1994. Father's education and landholding are continuous variables. SC/ST refers to scheduled castes and scheduled tribes, OBC refers to other backward castes. Unmarried is an indicator variable that takes the value 1 if the child was unmarried at the time of the amendment of the Act, i.e. 1994. All regressions include gender specific year of birth fixed effects and household fixed effects. All pair wise interactions are included but not shown. Robust standard errors in brackets are clustered by village \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table A2: Robustness Check: Effect of the Amendment on Marriage Market Outcomes of Women**

Dependent Variable	Age at Marriage		Number of Children		Spouse's Education	
	(1)	(2)	(3)	(4)	(5)	(6)
Married Post 1994*Reform State	0.595 [0.326]*	0.587 [0.342]*	-0.258 [0.106]**	-0.265 [0.110]**	0.871 [0.181]***	0.885 [0.194]***
Married Post 1994*Reform State*Father's Landholding		0.003 [0.000]		0.001 [0.000]		0.002 [0.000]
Married Post 1994*Reform State*Father's Education		0.014 [0.096]		0.016 [0.041]		0.236 [0.247]
Married Post 1994*Reform State*SC/ST		0.008 [0.009]		0.005 [0.065]		0.019 [0.036]
Married Post 1994*Reform State*OBC		0.004 [0.005]		0.013 [0.003]		0.112 [0.678]
Observations	5281	5281	5281	5281	5281	5281
R-squared	0.77	0.77	0.77	0.77	0.77	0.77

Notes: Reform State is an indicator variable that takes the value 1 if the state is Maharashtra or Karnataka and zero if the state is either Uttar Pradesh, Bihar, Rajasthan, Madhya Pradesh or Orissa. Married Post 1994 is an indicator variable that takes the value 1 if the female married after the amendment of the Act, i.e. 1994. Father's education and landholding are continuous variables. SC/ST refers to scheduled castes and scheduled tribes, OBC refers to other backward castes. All regressions include state specific year of birth fixed effects and household fixed effects. All pair wise interactions are included but not shown. Robust standard errors in brackets clustered by village, \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%